Thermal Power Heats Up Nevada

By Bryan Walsh, Monday, Mar. 03, 2008
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Smack in the middle of the Mojave Desert, the Las Vegas area gets around 330 days of sunshine a year. February 22, however, was not one of them.

That was bad luck for the Spanish renewable power company Acciona Energy, which had chosen that day to publicly inaugurate its new Nevada Solar One (NS1) thermal power plant, around 30 miles from Sin City. The sky was darkened and violent winds rattled a canvas tent that held dozens of Acciona executives, energy experts, journalists and even a few celebrities like the astronaut Sally Ride and the ubiquitous green actor Ed Begley, Jr. But while the unusual weather might not have put the Solar One complex in its best light (or often, any light at all), it didn't dampen the potential that the plant represented. "NS1 shows that solar power is a proven solution for the U.S.," said Acciona North America CEO Peter Duprey, who helped run the project. "This is the way of the future for power generation." (Hear Duprey talk to TIME's Bryan Walsh about the plant and the potential for solar on this week's Greencast.)

NSI is solar power with a twist: it harnesses the heat of the sun, not just its light. Instead of directly converting sunlight into electricity with photovoltaic panels — the kind you might see on rooftops — solar thermal uses rows of specially curved parabolic mirrors to focus sunlight on a pipe full of synthetic oil. The sun's energy superheats the oil, which is then used to boil water into steam. The steam runs turbines, which generates electricity. The technology is as simple as any fossil fuel plant, and cheaper by material than the technologically complex photovoltaic panels. It can be more easily built up to utility-scale than photovoltaic solar — Acciona's plant, which began operation last year, produces 64 megawatts of electricity for the utility company Nevada Power, enough to light up 14,000 homes. The company's Spanish competitor Abengoa just announced a

plan to build a 280-megawatt solar thermal plant outside Phoenix, which would be the largest such project in the world.

All you need is a lot of sun, a lot of space and a lot of mirrors — and NS1 has all of the above. 182,000 parabolic mirrors are spread over 400 acres of flat desert, creating a glistening sea of glass visible from miles away. Up close they're shaped like shallow satellite dishes, chasing the sun's movement as it passes through the sky. On the cloudy day I visited, the plant was running at less than full capacity, and some of the mirrors were turned downwards to block the force of the wind, which had the glass vibrating. Although the plant might look like fragile, it's not; plant manager Robert Cable told me as we tour the facility that NS1 has only lost around 10 mirrors in 9 months of operation. "This is not a special project," he said as we drove through corridors of mirrors. "These things work. We're here to make money."

That last point has held up solar thermal in the past. Though the basics of the technology are over 100 years old, NS1 is the first solar major solar thermal project to be built in over 16 years. Unlike solar photovoltaics, which can be useful on a house-by-house basis, solar thermal really only becomes competitive once it reaches utility-scale. It's all or nothing, and in building the plant, Acciona stuck out its neck. "No one was taking the risk to develop this technology," said Acciona CEO Josè Entrecanales. "We had no real evidence, no real certainty of efficiency."

But Nevada was a good place to try. The American Southwest receives plentiful sunshine and doesn't lack for the sprawling space solar thermal plants need; plus, the state implemented aggressive policies in support of renewable energy, requiring at least 5% of its power to come from solar by 2015. (Nevada now leads the U.S. in solar energy.) Without that renewable portfolio standards, Entrecanales says, it's unlikely Acciona would have been able to build NS1. "It would have been a very risky venture."

With the success of NS1, Acciona is planning on adding an additional 500 megawatts of solar thermal power in the U.S. by 2011. That's just a fraction of the new power capacity a growing America will need over the coming years, but there's a chance that with the right federal policies, solar thermal could contribute far more. Its proponents believe that alone among major renewables, solar thermal has the capacity to displace fossil fuels on the utility scale, perhaps eventually taking up a quarter or even half of the national power supply. A study published in Scientific American in January sketched out a grand plan where by 2050 similar solar thermal plants would cover 30,000 square miles of the mostly empty American Southwest. To provide power at nighttime, excess energy produced during the day would be stored using compressed air or molten salt. (In the former, solar power is used to compress air in an underground cavern, which is released as needed to power turbines; in the latter, the sun heats salt, which retains its heat for hours, enough to keep the plants running at night.) The authors estimate solar could supply 69% of U.S. electrical needs by 2050, enough to free the country from its reliance on coal and foreign oil. To get there, however, the government will need to put a price on carbon and implement reliable subsidies for the solar industry, so companies like Acciona can invest for years ahead.

For now, that future is still a desert mirage. Less than 400 megawatts of solar thermal have been deployed in the U.S., and Entrecanales worries that a lack of water could limit the growth of the technology in the very desert areas that receive the most sun. It also hurts that the federal investment tax credit on solar power is due to expire at the end of the year, and it's not clear that a distracted Congress will renew it in time. But even on a cloudy day in Nevada, the future looks bright for solar thermal. "This is a wonderful technology," said Begley Jr. "We're headed in the right direction. We're getting there."